**On Communications** Oerter Datacom

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of the control of the your months of the your months of the your months of the your manager of the your manager of the your can see our POP-OM X-100 modem makes witting started a fot simpler.

ommunication is simpler too feedause we let you switch tack and forth between voice and data on the same line. That way you don't have to hang up and re-dail just to find out if simebody got what you sent.

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The POPCOM X-100 uses the mist popular software communications packages availing today.

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- Plug the modem into a power source
- 2. Turn on the computer
- computer
  4. Plug the telephone line into the
  - 5. Plug the phone into the modem
- Plug the transformer into a power source
- 2. Plug the transformer into the modem
- Switch on the modem
   Determine whether your computer is a DTE or DCE
- Carefully open the case of you

CAUTION, MAKE SURE THE POWER
IS OFF BEFORE OPENING THE CAS

- Set the eight binary switch (consult your manual for details)
- 7. Carefully close the case
- Plug the telephone line into modem
- computer
- O. Turn on the computer

OTE IF YOU WANT TO SIMULATE DICE DATA SWITCHING GO BUY NOTHER ADAPTOR

NOTE THE POPCOM MODEL X-10 ONLY COSTS \$475.

#### **PRENTICE**

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## **CONTENTS**

13

The Light Brigade

By Kavin Murphy
No longer is there even a thread of a

By Kevin Murphy
No longer is there even a thread of doubt about the future of this trendy transmission technology.

19

Please Pass
The PBX
By Pattl Hartigan
Sharing is taking on a new direction in communications with

Protocol
Conversion
By Tony Kate
The proliferation of personal
puters has pushed persocol o
size into jub tilizeligits.

Florida Regulation

by times times to the Follower mental for the Follower mental for the Follower medical the regulatory with the follower medical the followe

The Proposed Look for the "D" side of a weigh heavily in the post-user environment.

Special Section: The Olympics

Go for the Gold

By Bruce Hourd
Olympics discus champion or vereras des communications servede
designed Al Octor has thrown
himself into both worlds.

Temporary
Telephones
by Katherine Higher
Afta's temporary elephone ass
tem upons the width and breadth of
the Olympic.

Message Moving

By Xutherbis Hafther
Electrosic mail for the mass
Here's a truly Olympic system.

The Glass Backbone

By Bruce Hoard
In the event you ever want to tie together ower 4,500 square miles of
sammer Observing connection

Mux Ado About Multiplexers by Les Sudan The multiplexer meumophosis makket in very lens a multiple

66

Paging Progress

By Halon Peterson

Roger about beepers. Paging is dispersional to the progress of the provides of the page 18 of the provides of the page 18 of the page 1

Front-End Processors

By D.R. McCormick IBM still stands astride the fre end processor marketplace it cu ed 12 years ago with the trusty 57

Electronic Funds
Transfer

By John Vacco
You can bank on the fact that EFT
networks are moving legal tender
face than ery before

/b







#### Remember When

Remember the good old days of AT&T?
Sure you do. You remember what it
was like when Ma Bell was always there
with a helping hand, when all you had to
do was make that one quick telephone
call to get all the answers to your telecommunications problems.
You remember what it was like before

you had to enlarge your waiting room to facilitate all the new companies selling equipment and services. And, of course,

faciliase all the new companies scilling evilusions and states. And. of course, evilusions and states are designed and states. And of course, evilusions and all that new to understand all that new equipment and all these new services. But then you thought ATAT was an accordance of the property of the

Now remember some more. Remember when paying your corpo-rate telephone bill was almost as easy as paying your home telephone bill? OK, AT&T, thank you very much, it is a plea sure working with you, love those leased lines. Things are a little different now you say? You say you have so many %(@?&! telephone bills, you don't know where to start paying? What? You don't even know if you're getting everything you've paid for?

Remember when you did? Well. . . AT&T, they uh, they charged

Yes, of course. But remember when you didn't have to dial 120 digits to make you didn't get a long-distance call, when you didn't get tons of junk mall at home describing the latest, least expensive way to beat Ma Bell? Come to think of it, Ma Bell was almost like a real person, wasn't she?

Think back Back to the days when all your future networking plans weren't put on the shelf until somebody named Judge Greene made up his mind. Back to the days when terms like "modem" and "multiplexer" were more important than legalese like "injunction" and "appeal"? But the government is only looking out for users.

Sure, and it's doing a good job and all, especially the politicians that work so hard for us, but remember when tele-communications was a one-step process, when there were no tough decisions to

make and everything just took care of it-self? Those were the good old days.

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The pioneer and leader in network monitoring and management.

#### How do you think AT&T is going to fare as a player in the computer market?

National Bank, Phornics

Competitively speaking, I
nk they are a little slow, but I
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us they should do e turnaround
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or the user's faith. One reason for this is that divestiture has brought this is that dive a lot of proble

Bana, New York
"My expectation is that they are
going to fare rather well. AT&T
seems to take a long time to decide on its approach and what it
wans to do, but once it commiss
itself, it usually has its act together. AT&T is going into the computer market full-blown, so I'm

sure R will be able to provide a significant amount of resources or significant amount of resources or whethere it takes to produce a resource or the produce a resource to the produce a resource to the produce a resource to the produce and the produce an

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biller i have dince making it in the biller is have dince making it in the collection because it is very complexed. The collection is a vendor like Digital in Coloriosity, ATA' will have different as well. Obtionity, ATA' will have different and of forth, will obtionable the collection of the collec

Walter E. Ulrich, president,

Houston:
"My hear feels that there is a balance, some good and bad things for ATeT. It is my sentiment that ATeT has an excellent opportunity: The potential is there. If they execute well, I think they will fare well, but they have some problems to overcome."

russ of all, let me make some ussumptions. Assuming that the hruss of AT&T's marketing is in nicroprocessors and miniproces-tors, which are offered in con-unction with communications systems, I think AT&T will fare

#### Do you have a data communications network or does it have you?

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#### Generation Gap



#### Net Conclusion

have just completed "Special Section" networks in the hissue of Computer

it cannot believe — after all this time of reporting the potential benefits of local nets and endors-ing the merits of true processor interconnectivity — that vendors and the Computerworld staff are



#### The Whisper Terminals, from 3M.

Three devices that plug in anywhere for instant TWX/Telex, electronic mail, and database communications.

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Overthe GTE Telenet public data network Use our Telemail service to exchange information on financing, personnel, pricing...inventory, delivery, forecasts —the vital, timely facts you need to own good juxgments. PC, you can broadcast messages to you entire organization, or communicate one-on one. Messages can be stored, and delivered when and where you wish.

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#### Lord of the Ring?







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tablish this point eby quell further rsy as to the pio-nature of the So-invention, Wile-filed reissue on in the U.S. Pa-

tent Office to obtain patent claims that present the in-vention in its widest aspect and which contain no ref-erence to a "master unit." "Protests against the reissue

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#### **CHANGING OUR** AME WAS A STICKY BUSINESS.

After 14 years as listered, it wasn't the excised that per the description of the control field of comparison that despited on our wasness that despited our per despited of the despited of the

offer in the future. We decided that changing our name would be an impo-tant first step in linking our past accor-plishments with future networking



#### Western Electric: What's In a Name?

Of course, where is a sease? On Changer and Changer an



phone company spo if not light or c world turned s def gray on Jan. 1, 1984 the murkiness bro the AT&T divesting cal Access and Tran

#### The Great Quid Pro Quo

Political Washington, D.C., is often masterful. Unfortunately, the genius of politicians, regulators and vested interested parties goestotally undetected, largely because the participants in the democratic process want is that way.

But the recent postponement of the access charge decision by the Federal Communications Commission (FCC) is an example of legislative and regulatory Washington at its best. All parties gained something and lost very little. Indeed, the FCC decision was a classic political and economic compromise, allowing ereryone us proclaim themselves victorious — some privately and

Let's examine the interests parties to see what they gaine and what they gave up when the FCC, at the suggestion of leading politicians on Capitol Hill, post poned the implementation of the \$2 per line per month access charges for residential users and the \$6 per line per month for sin gle-line businesses. Businesses with more than one line have to pay the \$6 per line per month, as pay the \$6 per line per month, as

of June 13.

AT&T Communications is a win ner in the long term, even thoug it claimed that it was a lose AT&T primarily wanted to defelegislation, and it dids 5. 1650 AL H.R. 4102 are now dead. A scalled legislative solution to it access charge issue would have

In addition, AT&T earns what could be a significant sympushy tote from the FCC. This may pay rich dividends in the long term when the FCC considers deregulating AT&T or allowing it to deaverage its rates selectively in order to meet the competition head

Pearce is president of information Age Beonomics, Inc., Washington, D.C., and a regular columnist with Computerworld Or Communications.



monthly line charges, they much brefer to collect their billions of follars in subsidies from a few communates, mainly AT&T Communications, than from 100 million subscribers.

phone companies were not ready to implement access charges locally and needed more time to reorganize under the new industry structure mandated by the Modified Final Judgment in the AT&T divestiture.

The regional Bell operating companies used the loss of cuscause to press their case on Capithe and rapidly growing inserttive and rapidly growing insertinserting the control of the control
marker. Many politicians promised that once the regional Bell
operating companies implacemened equal inserconnection for the
cations, they would then support
the regional companies' reenry
isso all toll markers.

romanis won a major victory is defeating legislation, especial since they believed that it woul seriously restrict their long-tern flexibility. Any legislation the prohibits or limits the imposition of access line charges would in pair a relephone company's ability to raise revenues.

There were, of course, som losses for the local telephon companies. These include a dra matically increased threat of loca bypass, particularly from AT& Communications. Furthermore the telephone companies can ex-

h pect continued strained relation of with state regulators simply be we cause of the conflicting goals State regulators want the lowes possible local rates, while the telephone companies want the highest possible rates, w # The rusal telephone companies

because a engol transition to Michael them the none. Politicians appear to be sensitive to the problems to be sensitive to the problems or and have content the PCs is south the impact of access change with more to be generated in solid will have to be generated in solid many mean that appearing a beginning and the problems of the problems of many mean that appearing the changes invest as the first of the problems of problems pro

In the long term, however NT&T's competitors have to cotront the prospect of intensifie competition as AT&T Communations strempts to desverage is axes while beginning to fight for levegulation at the same time. All of this means that the othcomment their own long-distance openment their own long-distance. icilities and perhaps even local yasse fullities. Major users of telecommunicaons services, while having to pay igher costs in the short term, ain because they are opposed to legislative solution to the access barge issue. The moor users now that their long-distance teleommunications costs are inevitative solute to come down, regardty solute to come down, regard-

begin measure.

The public interest groups be ever that they scored a victor bey would have liked legisla on, but their primary goal was else of the \$2 and \$6 custome coss charges. Unfortunately, thousance will have to pay any, one way or another. It apart that increased local enteres that increased local

change mes are inevitable.

The state regulators wanted a postsponement of the interstate end-user access charges because of complaints about rapidly increasing local exchange nites, see they also won. In addition, the FCC decision gives the states as poportunity to postpone request by the local telephone companies for intrastate end-user charges.

Nevertheless, state regulator problems will continue unabase largely because of the pressure of the local telephone companies increase their revenues in order tupgrade the massive amount outdated and inefficient plant the must be phased out of the rat base very rapidly.

The U.S. Congress is a clear win ner since it got what it wanted defermal of access charges so pol ticians running for reelectio could justifiably claim they hav kept local rates down and save public money.

ho control its pure strings, in dox arrangonize any of the me participants, with the possible properties are present to the participants, with the possible properties are properties. The Whate Rosepan did not want to Forced into signing a bill the forced into signing a bill the properties are major U.S. cooperations, Re- employ U.S. cooperations, Re- employ U.S. cooperations, Per angle U.S. cooperations, Re- to make U.S. cooperations, Re- to make U.S. constitution of the properties of the prop

does best. Groups with widely di vergent views and tuercess can sit around a bargaining table and all of them can come out smilling since they are all good actors however, they can wipe the smile off their faces by the time they speak to the press. After all, the sits thing they want the public to know is the rules of this very complicated but enloyable same.



#### BY KEVIN MURPHY

Fiber optics has already had a major npact on long haul telecommunica-ons. Most telephone trunking applications are now turning to optical waveguide fiber as the transmission medium of choice. AT&T is currently installing a fiber-optic backbone through the Northeast Corridor of the nation's telephone network, and work is starting on a transatlantic fi-ber-optic cable.

beroptic cable. Now that fiber is an accepted trans-mission medium, it is being used increasingly for shorter distance computer data transmission and lo-cal area networks. In January, Cor-ning Glass Works introduced a new type of fiber that facilitates the use of already developed telecommunita-

Murphy is a product and market pecialist in the Telecommunica-ions Products Division of Corning Blass Works, Corning, N.Y.

ons-type connectors and equip ent for low-cost data communica

nent for sur-cons systems.

Both supply and demand sides of he market are stimulating interest in ocal network fiber-optic links. Man-facturers are making hardware tartocal network mer-opic tinas. Man-ufacturers are making hardware tar-geted specifically at the needs of short-haul transmission. Prices are dropping with the accumulated pro-duction volumes for all applications. Local network users want to take ad-vantage of what fiber has to offer-higher transmission rates, longer lengths requiring fewer repeaters, and immunity to electromagnetic in-

terference. The market for short-haul fiber-op-tic systems is not as homogeneous as that for long-distance telecommuni-cations. The local-area network is a broad and hazy concept, since it en-compasses a number of transmission services in a wide variety of system configurations. Computer data trans-mission may involve connections

within a mainframe or communica-tions from a mainframe to and within different buildings. Industrial applications range from carrying process control data to with on monitoring for plant accuraly. The pioneer the local cases are written to communicate the pioneer dependent of the standard carrier. The local network do-noctions to telephone subscribers, limits to cathle television subscribers limits to cathle television subscribers homes, any networks within a cam-pus on office building or even transaction. The market for short-hand life-rop-tic systems is forecased to be on

tic systems is forecasted to be of the verge of significant growth the verge of significant growth. Gnostic Concepts of Menlo Park, Calif., puts 1983 fiber-optic sales to the U.S. computer market at \$12 million and predicts sales will reach \$44 million in 1987 and \$78 million in 1990. Slightly faster growth is ▶

#### iber Optics



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DECnet is distinguished by a remarkable set of high-level user functions. These are available to every network user. From every point on the network. On a DFCnet network of

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lence in networking is best measured from the user's point of view. And by and large, communications on a Digital network is just plain automatic. You can transfer files by simply noting the node of the



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#### Fiber Optics

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The market for short-ha
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BY PATTI H

years ago when it wired the Merchandise Mast and the Appaired Center in Chicago, One of ECA's Place, 1 46-sony tower in down town Chicago. The building fertures ECA's Exchange Information System, known as Excin Foltzer, an in-bouse measure or Foltzer, and shouse measure or Foltzer, and Soure, a system through which users can share software, data base access and pooled word processing, and in a nologiest Corp., ECA is recording several buildings in Dallas for

Another type of service is the prime tenant offering, in which large tenant with subsequently large telecommunications need shares its system with the othe tenants in the building. One such Another type of service is the prime tenant offering, in which a large tenant with subsequently large telecommunications meeds shares its system with the other tenants in the building, One such setup is Planning Research Corp. (PRC), a McLean, Va. based research firm. PRC rents the whole building from the camer and subleases to small tenants on a

sbort-term basis.

(PRC), a McLean, Va-based research firm. PRC rents the whole building from the owner and sub-

rangement in which it offers' e shared communications services, an art department, a cafeteria and a slew of other amenities (see sidebar below).

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the word in place. I feet the word in place I feet the word in the word in place I feet the word in the word

Although an AT&T It formation Systems spoke man declined commen on the petition, representatives of independent sevice providers were quivocal about it. "Once you allow AT&T Information Systems to get involved it."

"I believe we have to keep the [Bell operating companies] in place: I fear their diminishment. I'd like to see them enhance their capability by offering more services, by competing with bypass technology," Day said.

long-distance, you've got essentially what you had

Bishop explained. and mi
"You go through all this expense

and millions of dollars of this expenses, and then you let

tems provide long-distance services — you might have just as well stayed where you were in the beginning." Bishop

victor Toth, a Resson, victor Toth, a Resson, via-based lawyer who spetalizes in communications, explained: "The cusconers would just as easily be served if AT&T would imply be satisifed with roviding the equipment, eaving the other partner

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syste, was over 200 AU (CONTIC) at the transact was some of the work's largest and most pressigious users, is a beclanogy leader in electronic matrix switching. So break out and join those satisfied users who are experiencing that and effective network restoral with the Piper AUTOSWITCH, the Automatic choice. Write or call for your Bytes gaide out of the toch control jumple.

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sibility for the long-dis-

ance portion."
At press time, the petition was pending before the FCC. "I think AT AT will be surmed down," Toth maintained And Bishop declared. "If you sak me, frankly, I think they will not be allowed to do it."

"AT AT TOCKERMEN DECLARATION."

HE PROPOSED AT&T-

ined.
"One of the few that has been on a steady basis is United chnologies, and they've ceruly enhanced the credibility of industry," McBride pointed

pen to a credible to AT&T Information on the AT&T Information of the action of the action of the competitive destruction. The competitive impacts than offset the credible competitive impacts that the credible competitive impacts that the credible competitive impacts that the credible competitive impacts the credible competiti

so well as keeping coas down.

HOM knows the value of a

Sold emission. She put you of beau

Sold emis



microcomputers and terminals, connects you direct to your main-

Just bow viable is the market? According to McBride, the verdict on that auestion will not be in for several years, due to the nature of the real estate market. 'I don't think anybody bas a track record of more than maybe a couple of years," be said. "We certainly don't have enough buildings using shared systems to get widespread acceptance of bow much this

can or cannot do for a building."

time," McBride explained. wired for shared tenant services.
There isn't even a consensus on Lucas claimed there are over 60 how many existing buildings are such buildings in the country.

have over eigns or nike or 10 keer ally installed.

McBride added yet another fig me to the list. To my knowledge there are not more than 60 buildings in the country that are active. It is the second of the country that are active by committed to the purchase and installation of a PBX on a shared tenant basis, although nearly evenone is thinking about the possibility. There are probably no

## lom Knows

## When it comes to efficient communications

or XT.\*\* IRMA is a Decision Support

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that slips into the PC and pro-

vides a direct link to the IBM mai

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work stations. Instantly MOM, which stands for Marketing of Micros to Mainframes, specializes in distributing sophisticated, statein distributing sophisticated, state- of microcomputers.
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And then, of course, there's sweet IRMALINE." RMA's sister, IRMALINE, links per-

sonal computers - no matter how remote - to IBM 3270 networks. And like her sister, IRMALINE is a Decision Support Interface. She lets compatible with the next generation of technology MOM stretches munication with your mainframe your computer investment dollars by via a 3270 terminal, from across adding processing capabilities to town or around the world BMMUNE.

frame with a local phone call rather than having to dial long distance. So you save money!



- another member of MOM's y-to get the same data capture functions IRMA provides. PC/COM™ The perfect mate for IRMA.

This software system works in con-junction with IRMA to provide high speed transfer of files between the mainframe and the IBM PC or XT: PC/COM's universal file transfer PL/COM'S universal me transfer capability is compatible with major BM operating systems and associ-ated application files. Single function keys provide users with easy-to-use menus to transfer text es, source programs, data and ject files between the mainframe and the personal computer

Users are subject to centralized mainframe control, so security is manufame control, so security is much tighter MOM believes in keep-ing a tight lip. AMUAR.\*\* MOM's UNIVERSAL

AWAR is MOM's self-contained microprocesior system that converts a terminal into a full-function, standalone personal computer All it tals is a simple cable connection between

more than 25 or 30 that are actual-ly working," he said.

McBride pointed out, however, that there is a rising tide of inter-est in shared systems, and Boma is putting on a series of seminars this month to address the poten-

THERE ARE iems. "I can tell from talking some of Boma's

"The older building is the one that probably has a bigger need for this service than anybody, because the competition is the guy with the glass and compension is the guy with the glass and steel building next door, and he is stuck with a building that is 10 or 15 years old," Bishop explained. "What does he have to sell? He needs this enhancement probably more than anybody to maintain bis position."

#### from micros to mainframe-MOM does it all.

the terminal and the host system. No terminal modification is required. You get PC power on the terminal in addition to your normal terminal in addition to your normal terminal capability in addition

ion, AMIAR is portable, so it's very easy and efficient to use. Buy AACDAR, and MOM will give you CP/M.\* MS-DOS.\*\* WordStar.\*\* CP/M.º MS-DOS.™ WordStar.™ CalcStar™ and CBASIC™ software. Absolutely free! File transfer software is available as an optional feature.



AWATAR PA1000: Another way to talk to any computer. The PA1000 protocol converter

allows you to connect any asynchronous terminal or PC into an IBM 3270 network and simultaneously into any asynchronous host system. You can do it from either a local or a remote location. The PA1000 has additional ports to which you can attach a printer



pact printer is bi-directional

135 citer-compresser.
The PC Traveler has graphics capi-bility and communication options (300/1200 BPS internal modern). The 8 meg floppy disk is upgradable to 16 megs. The computer uses 16 bit, dual 80/86 processors and is 10 times faster than the IBM PC. Available for delivery, Jan., 1984. MOM and PATCHES.<sup>18</sup>

The PC Traveler<sup>30</sup> is a full-function BM-compatible, portable computer A 28-pound wonder, it comes stan-dard with a gas plasma display for 25 lines/80 characters, 128k RAM memory and an BM PC-type re-movable keyboard. The dot matrix

Anything worth preserving is worth protecting, so MOM developed

tern insures the integrity of her tware. This system allows users to by MOM's software for their interpy sount's sommer for their inter-al use, while a companion chip istalled in the PC prevents un-otherized use. PATCHES males and esps software and communications rate and secure



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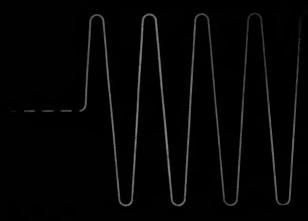
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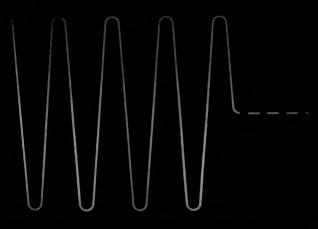
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and testing. Up to 256 control modems can be

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monitured through this single deals-top console— Level III incorporates the Diagnostic Control-ler, and did a Nework. The Diagnostic Control-ler, and did a Nework. The Diagnostic Control-respanded diagnostics and control. Adding a printer provides hard-copy reports of faults and test results. DATAPHONE II Service Level IV is our new-sest offering, with eight times the capacity of Level III. Its design and functionally are suited to the

III. Its design and nunconancy are season to be largest, most complex networks.

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organizations rovide maintearise to prov anagement of The Shared e system. rrio

country.

According to Leach, after the switch is sold to a developer, her group acts as an agent for the developer in managing the

According to Daly, every access point to the system at PRC is under lock and hev. "We don't permit AT&T installers access to the switch room until they sign in and provide credentials that prove that they are who they say they are."

switch. "The tenant calls system. This can range my phone or "I don't un-tion my phone doesn't derstand this particular concern he has with the work or "I want to move charge in my bill." AT&T

Leach explained

ioes not involve provi basic services to end te ants as does the propose AT&T Information Sy tems-United Technologic

System security is another concern, but one that seems readily solvable. Some prononable. Some proponents of shared services claim that shared tenant systems are shared tenant systems are potentially more secure than stand-slone systems, because one entity has coursel over all of the cabble systems are successively as the system of the system of the system at PRC is under lock and key. "We don't permit ATAT installers access to the system at PRC is under lock and key." We don't permit ATAT installers access to the system of the system o

are."

In addition, all billing is done by PRC and recorded on magnetic tape. Access to that tape is restricted to

work. I

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m's autobeud feature which modem's autoboud feature which automatically adapts the speed of the multiplexer to match your DTE. The CDS 224 Superduplex auto-dater places and rediets any access or telephone number using interac-

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many in the next year.
This incredible penetration of Pesonal Computers in the corporate environment and the resulting registered to integrate them with existing electronic data processing systems has created a dramatic increase in the demand for protocol converters. Projections show that the market for hardware and software protocol converters for 1994 will be equal to the currently installed base of \$500 million.

Naturally, this has prompted a corresponding increase in the number of

Katz is general sales manager, Sim ware, Inc., Ottawa, Ont., Canada.

rotcool conversion is supplies and products available to sense or foundary houses en. If prococci conversions is defined topics, particularly when, as the shifty so make Acel terminals to not the problem IBM 3270 errotmoners, there are well of micro-o-ministrane over 50 suppliers, and the list is still communication links growing. However, the basic appearance of the sense of the

categories:

# Hardware protocol converter boxes.

# Add-on boards for the IBM Personal Computer.

\* Majorana paridon coffmus for

Computer.

Mainframe-resident software for protocol conversion.

Hardware protocol converter boxes have been the traditional protocol converter — a black box that appears to the host as an 1BM 3270-family

chuere controller on a Binary Syncheroson Communication or Syntems Network Architecture/Synchronous Data Ilah Control (SNA/SDLC) line. The user connects his Actil devices to the box directly or via dial-uptories of the box directly or via dial-upconverter varying and depending on the make and model. Rener Corp., PCI Systems, Inc., Datastream Communications, Inc., Local Data Co. and Comes Scientific Corp. ue only a few device.

of the leading suppliers of this type of device.

In addition to offering 3270 support for the Personal Computer and a variety of popular Ascil terminals, these devices provide remote access and have virtually eliminated the need

## PROTOCOL BY TOMY CONVERSION

#### Protocol Conversion

HERE ARE TWO DIS-tinct types of add-on boards for the IBM Personal Computer. The first converts a Personal Computer

ler Via communications Asso-ciates, Inc.'s Irma and CMI, Inc.'s Poor board are two examples. For a cost of about \$1,000 per Person-al Computer, this is an attractive alternative if you already have a

ROTOCOL CONVER-sion is also becoming an integral part of the larger communica-tions environment. Proof of this is demon-strated by the recent announcements of such telecommunica-tions industry giants as relecom, inc. and Rolm with new contration of

As the competition in the proto-olo onversion market intensifies and as other technological devel-pments impact the communica-ons field, a new-trend is rapidly ecoming apparent: Protocol con-persion alone is insufficient in any cases. Vendors must be able



and reserve vast resources for tomber to the state of the sta



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#### Protocol Conversion

provide Ascii CRT Personal Com puters and 3270 users with ex tended capabilities in an en

hanced terminal environment.
This trend is another direct no suit of the impact that the Person all Computer is making on the protocol converter market. A example of this trend can be found in the results of a special survey of protocol converter use and those actively evaluating

them. The wat majority of respondents indicated that interactive file transfer for the Personal Computer — upload and download with on-line error detection and correction — must be available for any prescool converte that them are applied to the control of the

minimum expectation. In response to these demands the more innovative suppliers are introducing new features to satisful moduling new features to satisful moduling new features for satisful moduling the satisful moduling the satisful features for the satisful features features for the satisful features for the satisful features for the satisful features features for the satisful features featu

Several other suppliers have be gun to provide additional capabi ities. Amdahl recently announce a product called Session. A though limited to VM, it provide both protocol conversion and se sion management. PCI System

Criteria
For Selection

When comparing products a lexical for evaluation, it is to posture to ask the following special con-

terminals are supposed of and how easy is it to add

Toos the quality of the emdon your needs what additional futures of functions are systematically a manufacture of the public for

a la dia product reliable? a la dia product reliable?

S Vijus | 100 quality of the my page I to 1 This hamping

is to complement on easy? is to it cost-allegion?

den costs?

Inc. has announced a dial-out fa cility to allow 3270s to access non IBM systems. Renex's protoco

IBM systems. Renex's protoco convertee includes compane code a feature that can increase throughout and lower communications costs by reducing the amount of data sent to the screen Comtex now offers a local processing capability for Aucil CRT in addition in promoton conve-

while there may always be a place for the basic protocol converter, there is every indication that the lion's share of the marke will go to those that can provide users with an enhanced termina

The key to providing these caabilities is software, whether on the mainframe, the micro, in a hore

or on a board. the flexibility to changing dema

Considering the consta changes and the options they can are, what criteria should you us when selecting a protocol contion system? The first step in maing this important decision is thorough understanding of creat needs. The next step is compare the products selected for

criteria (see the box below).

The last step is to evaluate it ture requirements, using the sam criteria as below, with the addition of ease and cost of any remind expression.

Quired expansion.

Since value and flexibility a

software option presently offen the user many advantages. These include low initial cost, ease of in stallation, future expansion, man extended features and the ability to react quickly to new demands to constitute the control of the too conversion and comprehen sive micro-to-mainframe communications without the fear of beins included in the control of the control of the microstopy of the control of the control of the microstopy of the control of the control of the microstopy of the control of the control of the microstopy of the control of the control

While it may be difficult is identify which suppliers wi come out on top in the crowde protocol conversion industry, it easy to pick the principal winne — the end users. Products the will continue to provide ever-it creasing capabilities and pric performance will be available t



Multi-PadX.25 Moves Your Network Plans Off The Drawing Board.

## IN THE FLORIDA REGULATION CLIMATE

#### BY BRUCE RENARD

Renard is associate general counsel for the FPSC, Tallabassee, Fla.

stach has occurred, both at the sate and conformed by the Pederal Communicational federal levels, since the wheely benedict ionsa Commission (PCO). U.S. redetal ATAT diventiume, which took place on District Court Judge Harold Greene and LaTAT diventiume, which took place on District Court Judge Harold Greene and has made the general ground rules clearer being played by state regulations at the low munications issues results that present an mission (PEOS) is actively exploiting these ongoing challenge to industry and regula-major issues. An examination of the cost like, Not only is this challenge being PFSC's actively exploiting these majoring challenge to industry and regula-major issues. An examination of the cost like, Not only is this challenge being FFSC's actively exploiting these majoring challenges of the property of the proper

The FPSC implemented a system of in-trastate access charges for Florida on



#### Florida Regulation

Jan. 1, 1964. Apart from the fact that the FFSC's system was in place when divestinze took place, the plan differs from the FCC's intessates access charge system in several significant ways. Although the FFSC approach does address the problem of bypass through a series of differing mechnisms, the plan includes

the FCC's proposed Customer Access Lim Charges, originally \$2 pe line per month for resi dential users and \$6 pe line per month for busi nesses. At press time, the FCC access charge plan had been delayed until

In Florida, nontafficsensitive charges are borne by the intererchange carriers on a busyhour minutes of capacity basis, a charge based on a measure of how much traffic a particular carrier is placing on the local network. This system appears to be functioning satisfactority and will continue to be monitored for future re-

Several aspects of the FPSC plan could not be fully implemented by the industry on Jan. 1, 1984 and these issues are now the subject of furthe workshops and proceedings to develop implementation plans. These in clude:

 Definition of equal-access exchange areas for boundaries between competitive toll and monopoly local service.

day-of-week pricing.

Use of tapered, contract
and volume discount rates

and volume discount rates for large usets.

Massessment of trafficsensitive charges on end-

interexchange carriers.

# Ellimination of pooling arrangements contained in the present access charge system. There is an attempt to replace the pooling arrangement with a situation in which the local states of the local states of the local states.

The Florida commission will investigate and hold hearings on these issues to implement as many features of its access plan as are reasonably possible by Jan. 1, 1985.

The FPSC continues to

The FPSC continues: process resale and facilities carrier applications for intrastate interexchange Heesage Toll Service as Wats offerings in Florid In addition, the FPSC hawarded poet divestigation internatate operating at thority to AT&T for its

## The FPSC continues to process resale and facilities carrier applications for intrastate interexchange Message Toll Service and Wats offerings in Florida.

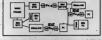
AT&T's authority extends to Inter-Local Access and AT&T is held to continued Transport Area service rate base regulation and only, and AT&T must "provider of last resort course to the FBSC for an obligations for intrastru

interexchange service.

On a more unusual
note, Microtel, Inc., Florisort" da's first certified intrastate state competitive interex-

change carrier, has naervened on several other carrier certificate application proceedings in oppoletion on sward of an envices of MCI Communications Corp., GTE Sprint and other interexchange parties will unnecessarily lupilcate services already lanned to be offered by discosed, the company has sked that the new intratase applications be de-

Here are two beautiful ways to get small computers on line with the mainframe quickly, essily and economically—yours from DCA, home of the industry's first coasial cable links between small computers and IBM 3270 networks.



IRMA is the Decision Support Interface that gets IBM Personal Computers and IBM PC XTs into the 3270 mainstream via direct attachment to 3274 or 3276 controllers.

### IRMA and IRMATINE. The DCA family connections that helps small computers think big.



It is safe to say that the FPSC and other state commissions will continue to be embroiled for some time in sorting out and reacting to the impacts of the divestiture at the local level.

RMALINE does the same for remove IBM PCs, IBM PC XTs, Apple Lises and DBC Rainhows, among others, with just a local phone call to a nearby 3270 controller. Both can go to work literally minutes out of the box. Both provide mainframe data access, selection and storage, and data communication back to the mainframe that provides the selection of t

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Datastream Display Stations and Remote Cluster

# R&

## BY STAFFORD HOPWOOD

with the breatup of ATAT and the resultant introduction of greater competition, the environment in which telecommunications companies conduct research and development has changed increased attention to marketing brings an ity and market appoel. This has a dual effect on telecommunications ABAD First, the emphasis will be on development: Marketers wars RAD with immediate practical application of the second of the situation is analogous to compute hardware and software. The situation is analogous to compute hardware and software the theorem as consider each most of the content of the co

The change in coopones suncture at ATAT has implications for Bell Laboratories, the flagshap of tele-communications & Bell Again, there are a sunctured as a suncture of the communication & Bell Again, there with an increased emphasis on make leaving, expect Bell Labs' inventory of new products to move off the steff much nine equiliby than in the steff much nine equiliby than in the steff much nine equiliby than in the provided by ATAT, the former giant communications monopoly, Bell Labs is not as likely to take the long view on research is a tonce did. It is a tonce that the stem of the

sistor.

Finally, while projected increases in defense spending make continued government subsidies of research likely, closer scrutiny by

Hopwood is a partner in the executive search firm of Ward Howell International, Inc., New York.



Congress can be expected, result-ing in calls for R&D work with a more rapid expected payoff.

S EARLY AS 1981

ment.

It is not hard to see that the pressures on R&D managers and technology executives will be intense. There have already been examples in telecommunications R&D of what happens when sufficient resources are not committed.

o a project.

To clie one example, several uppliers trying to develop and uppliers trying to develop and hospes (PRV) and into serious sources of the control (PRV) and (PRV) an

ong.

The problems, then, are immete. Unfortunately, there is no
ck fix. There is a way to get the
st out of an R&D program, but
akes time and commitment to

ESEARCH AND DE-velopment is a sensi-tive industry subject.

Most commercial R&D work involves the reduction of concepts to practice: taking an idea that exists only on paper and

working on it until it is no longer an idea, but a concrete piece of bardware or software. There are several ingredients that distinguish a well-managed research and development department engaged in this type of work: direction, interaction, the right personnel mix and realism.

n the work that leads to real a proper course to take. Tel reakthroughs.

Given the risks involved, this is a practical matter, be expected to

shoulder the costs and risks of be-tween-satellite communications R&D, for example. Their share-holders are not likely to sit still for

Most commercial RAD work in-wolves the reduction of concepts where the reduction of concepts with the concept sist only on paper or in someone's head and working on it until it is no longer an idea, but a concrete, or software, for instanger of research and in the concept of the concepts of the conce

Many researchers like to feel nat they are free to pursue their

The majority of researchers realty do de-sire some direction in their work. In a good R&D department, that freedom ex-ists, but its limits are defined. There is an

objective to be reached, but researchers are free to reach this objective by their own methods. That is the freedom the re searchers really want — to follow their own routes to a solution, taking the detours they need to along the way.

Living with errors in computer communications is just another way to play Russian Roulette. Sooner or later something serious is bound to go wrong. Ask the major New York insurance broker where a one-digit miscommunication caused a \$1,000,000 error in a client bill. Or the medical lab where a mistransmitted enzyme count came within minutes of costing a patient's life. But now, Microcom™ introduces the Era 2 SX/1200,™ the stand-alone 1200

baud modern that provides 100% error-free data communications, and that's

easy to operate and cost effective. Fra 2 SX/1200 implements a machineindependent. error-correcting protocol, called

MNP™ MNP detects transmission errors between Era 2 modems caused by line interference or low quality telephone.

connections, and retransmits lost or incorrectly received data.

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is 1-800-322-ERA2. We'll send you a complete brochure and spec sheets to show you how dangerous errors in communications are a thing of the past.

Only from Microcom.

likely to allow it to pursue. There more than that breeds frustration on the part of those that are generating the ideas and frustration on the part of the company because the company cannot possibly afford to fund all development opportunities.

some ways, the mo important ingredie in an R&D effort is good dose of realist. The most successf companies in terms research are those which the econom realities are alway part of the local system of manage

The final, and in some sorys, the most important signodient in an RED effort is a good dose of realism. The most successful companies in terms of research are those in which the economic realistics are shough part of the total system of management, researchers know from the start of a project that certain standardsmust be met in order to get additional funding and more forward.

ers know from the start of a procial standards, must be met in orect that certain standards, der to get additional funding and including commercial and finanmove forward. They have to be able to show that their projects will eventually generate products that will yield, for example, a 30% return on intribit systems, coupled with regular teneration among researchers, fosters what I consider to be a relative amonghere in which relative amonghere in which relative amonghere in the property for the property of the proting of the property of the proter of the property of the proter of the property of the proter of the proter of the property of the proter of

This environment even works or the tree choppers who, with a tile work on their salesmanship, hould be able to show that their ook will have a valid application and real payoff, even if it is a little

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UT TOGETHER, ALL
these lagrediens result in self-regulating
researchers, ones who
feel responsible for
the progress of their
own work, Most of the
RAD departmens I
RAD departmens
havior, As a result, they sometimes get off counce early in a project, with no system to help them
get them back on track.

iver, top management steps and cass off funding, as in the diital PBX experience. Researche
who go through this experience
few times may begin to feel th
management will support the
only if they follow a given cours
As a result, these researchers may
become conformists. And the
may lote the entrepreneuri
drive that probably brought the
into the profession in the fit
into the profession in the fit

As mentioned at the outset there is no quick fix for producin this self-regulating environment Probably the most frequently at tempted fix involves bringing is managers who have established reputations elsewhere for runnin innovative research departments Unfortunately, this attempt alone will not necessarily change the outset of versis in an R&D pro

To nutrure creative research and development, there has to be a commitment from the top for change. Then, it is necessary to find individuals who can success that the commitment is in necessary to find individuals who can successary to find in the committee transformation. It is necessary to find managers who are broad enough to realize that there will have to change a cross-the-board is

to realize that they too will have to adapt themselves. They mu work diligently on their peers t make them realize that chang will have an impact on then These managers must convinc their peers that it is necessary tchange. In addition, they muswork to maintain support from thighest levels. These qualities are as important as having a record of

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# GO FOR THE GOLD

## By Bruce Hoard

The tono of his missive body anomentally obscured by a sparwing plant, Al Oenter first comes into view from the vains down a reason of the come of the

Hoard is editor of Computerworld On Communications

### Al Oerter

ge of 47. He has also designed ome presty fair data communica-ions networks here for his em-holyer of 20 years, Grumman Data systems Corp. Add to that his time reating automated numerical outrol systems, programming of managing programmers, and

systems Corp. Add to that his time resting amounted numerical resting and the complete systems, programming the final product is an experienced DP/data communications. So which is the first and forenous: Al Genter the unparalleled hympics champion on Al Genter how does not be the first and forenous. Al Genter the unparalleled hympics champion on Al Genter to work of the control of all the control of the cont

"The two are complementary," Oerter says of discus throwing and his professional career. "Each is trying to perfect its own craft. I'm trying to perfect the throw and gain a place on the '84 Olym-pics team, and obviously Grumman is trying to perfect its technology. It is difficult to win gold medals, and it is difficult to stay completely in front of so many technologies in the computer field."

question after nearly 30 years of chair, he contemplates the two interviews. Leaning back in his worlds. comfortable conference goom "The two are complementary,"

es says of discus throwing and his rofessional career. "Bach is tryng to perfect is own crist." I'm ying to perfect the throw and ain a place on the 76 Ulympics ann, and obviously Grunman is ying to perfect its technology, here is a sense of accomplishment with a sense of accomplishment when it is office, and it is written and the sense when it is official to any completely in front of so sarty technologies in the computfield."

T 47, HE STILL HAS a full complement of swept-back blond hair that is barely

the right nostril to the corner of his mouth.

On this coid, noney March day, On the coid nostrone, and the coid nostrone sport shirt and cowboy boots. The shirt is filled out in a way your arrage 98-pound weaking can only dream about. Stated simply, muscle topped off by mountainous shoulders that taper down to a slightly pausority waist. The man is strong, arong enough to bench worknown, wondown.

workout.

He speaks in deep-throated graveily tones that befit his uncommon physical szature. Owe the telephone, his rolling thunderous voice is intimidating and aloof. In person, he warms up quickly Go ahead, call him Al, it's OK.

ONTINUING HIS parallels of the two worlds, he speaks of computer on the party and the company of the

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tion Center should be a company-wide resource taking adva-es through the integration of hardware, software and data co re companies in the world. There are man unles in the world. But I.P. Sharp is the o

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r goes for his first gold medal and sets an Olym

sary quality and que zity of be says.

ter's two worlds are not almutually exclusive of each
he says, holding a plastic
oup that looks like a thimhis mighty hand. His athlething is added by such his

soot, decileration and supercope con all the examined and instruction and the control and the

raining a of a lot of e

on, she is much a

It's not that he wants to put tore emphasis on the competi-ve side of his athletic life. When pects of sports. He ga 25 to 30 motivations last year, charging i \$1,500 and as much He has spoken about far in this Olympics ye

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become an inte pieces of DNC is is to have the m

# ERG SA 15 BM!

Incredible as it seems, even Big Blue needs to be bailed out now and then. Personal computers are such a runawey success, they're running Information Man-agers ragged. The problem is personal computers and

mainframes don't always work together.

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networking. Under your control.

And only MDS offers you INTELLIGENT 3270.

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MOHAWK



puters strached to the machine tools themselves. The main computer will speak a universal parts program language that routes programs to the local computers. Oetter is bringing his data communications background to the DNC task by setting up links for the numerical costrol programers and others who manage inventory and data collection.

"These networks have all the

"These networks have all things you want to find up o some broadband network thankes its way through a production area with are welders an high-interference machinery," hexplains.

the Autoria section of Queens, New York, in 1996. The son of a plumbing contractor he had a constitution to he had a constitution of the had a const

He remembers his father as a "mini-entrepreneur," an aggressive businessman who inherited his business from his father. Keeping things in the family, on Estero Island in Fo Meyers Beach, Fla. H retire there for the winters in of five years. erter is unpretentious despit

Little-known here in the U.S., he is widely admired in Europe, a continent that takes its epic athietic heros seriousty. Oemer couldn't be happier about his relative anonymity here at home: The last thing he wants to be is a a ceiebrity.

myself to be even a minor, minor celebrity," he declares with conviction. "If I couldn't go to a restaurant with total anonmyity..." He pauses, obviously disturbed by

Then he picks up again by mentioning a famous athletic lriend in the fast lane of I.Os Angelei hype, beautiful people and noure ality. "I like flucie I just just him every time I see him." he says with the beautiful people, and the doesn't like what he sees in their public images. "Pirme change the public images." Pirme change the public. Their personalities change. I don't know if their ego feed on it or if they become defeed on it or if they become defeed on it or if they become

Oenter's unpretentiousness is evident to his co-workers. Inez Bodensiek, who was Oenter's secretary for eight years, says, "He's a super guy, easy to work with, has a

great personality and a keen sen of bumor. He's always the sam his personality never diffiers. He easygoing and pleasant." At Oester applies the same disc piine to his professional work he does to throwing the disculle is "conscientious, diliger

He is "conscientious, diligent thorough and very fair," Boden sick says.

Why is he attempting this im probable complack after already

probable comeback after already having reached such pinncacles? "Because it feels good," he ripostes. "There's a chance! I can make it even though! am working at a theoretically advanced age for this sport — perhaps any sport," he adds with a laugh. Oerter, the recessing understown police out.

the one he was neiespard to before the 1966 Mexico City games, his lass gold medal Olympics, life usant given much of a chance to the control of the control of the things say the same, the better. He is currently ranked fifth in the U.S., a folly ranking for some one pushing 50. At various times, one pushing 50. At various times, one pushing 50. At various times, all four of the athletess meed sheed of him. He acknowledges that shoot vetcories are in the past and circs the "Gianspacet" state he has

Despite that tess than sanguine sentiment, Oerter is well on track to making the team. Last summer, be said he wanted to be throwing a in the 220-foot range by now. (The world record is just over 235

inches last November. About two months ago, he hit 210 feet is "very cold weather" with no wine to aid his throws. Between now and the June try

pouts, he wants to compete every second or third week before arriving in the Los Angleles Coliseum for the June trials. His most time portant concern at this point is his health. An elbow or knee injury rould bring his comeback to an abrupt and final halt. Beyond that, he wants to in-

Beyond that, he wants to it crease his strength by 3% or 4% He feels strong now, so it is tim to convert that strength to throwing disance. For that, he need seemed doubtful at best on Lon Island in March and April. Right before the trials, he will spend least two to three weeks at "not ing but intense work. That is eliminating all considerations of potentials and Emily and

And what if he doesn't mak the 1984 Olympics team, what is the champion's internal spirit that prevailed four times previously a the height of Olympics competition abandons him on the floor of the Collseum?

"I'll be disappointed, in al honesty," he says. "I don't know how to explain it to people," he adds, halting briefly to flind the words. "It is not a crushing end roment at all, because I really debelieve in all honesty that I will be at my best. What else can I as of myself?"

Special section. The plympics

## TEMPORARY TELEPHONES

By Katherine Hafner

If preparation for the Olympics is traditionally an exercise in taking care of councies details, then the 1994 Summer Olympics, dispersed over 4.500 square miles in Southern California, promise to surpass pass games in the demand for butations of logistics wizzeds. In June 1994, TRT signed a contract with the los Augeles Olympics Organizing Committee (UAOOC), along with Facilic Telephone, the former Wesern Electric and the Yellow Jaolic Telephone, the former Wesern Electric and the Yellow Ja-

Hafner is senior writer for Computerworld On Communications.

## Olympinet

If you think this entails running a little temporary cable through a few buildings and tapping a few dozen trunk lines into the local telephone company, think again. AT&T's investment in the

temporary system has soared to much more than its initial \$4-million commitment.

gust, to serve the 1,200 games. The rest of the net-taOOC employees and work is gradually being the time the first event others organizing the phased in and is expected starts on July 28.

"There's a c

erical Cop. PC Stations and harduper Stationism on understands of hardbard Stationism increasional Cop. since Markons Cop. THE SCURCE is a service mask of feature Missengaring Cop., a substance of The Station's Dipo-

## Olympinet

All the phone sets will be custom-built for the Olympics, with black bousting and face plates decorated with the Olympics logo of a red, white and blue "star in motion." The 900-type white and blue "star in motion." The 900-type sets will feature call waiting, forwarding and bolding, automatic call back and call pickup.

m/85, but since it was in as the Dimension, we we already have people neurolled introduction chose Dimension because trained on it."
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other toon It-a, IC-touspesses.

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TC Exchange also puts at your command a

PC Exchange from Intelligent lechnologies

## **Olympinet**

AT&T bas also devised a disaster recovery plan with full backup procedures in the event of power failures or "sabotage" activities such as the cutting of cables, terrorist acts or "bostage situations," according to Jim Peltier, an AT&T installation supervisor for the games.

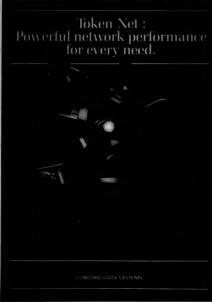
The manual trouble-shooting is complemented Southern Califoria install by a remote maintenance tion office in Los Angelo

arm's length with the op-ating companies. And y the involvement betwee AT&T and Pacific Beil very close at the Olympi-The only way we can me the demand is a joint eff-

ng systems."
The constraints of the divestiture of the Bell System require that all dealings between AT&T and Pacific Bell or General (Continued on Page 54)



This AT&T Pictogram ide



# GIVE PERSONAL COMPUTERS THE SNA OR BSC NETWORK RECOGN



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industry executive makes so clear). In only thirty years the industry has gone from the development of the giant Eniac system, through the tube-powered, water-cooled Univac I (the world's first business computer), to the incredibly cheap, battery-powered microprocessor

But as unbelievable as the last 30 yes have been, the next 30 will probably be even more incredible. In the next two years alone, the installed power of al purpose computer systems will grow almost as much

as it did in the previous 16 years. And the supercomputers of the 90's will transfer data at a rate several hundred times faster than even today's speedy computers! It's hard to remember this is real science, not fiction This extraordinary increase in efficiency has led to a rapid

expansion in computer use, as human ingenuity finds m and more applications for these powerful tools. So the market for computer products and services has turned ou to be more elastic than most observers had thought.

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## A Case of Mutual Ra



(Continued from Page 50) Telephone of California be strict business arrangements, and whenever business is done, contracts must be drawn up. AT&T must now pay Pacific Bell and General Telephone for any service or goods received and vice

ersa.
"We have to be very careful that we don't do anything in conflict with the court orders of divesti-ure," Petiter noted. "Seeing as hey were going to be there to lay onduits, we thought we'd have been run our cable if we provided

"It is a great idea at a hell of a cost savings. But that is seen as collusion. So we are paying Ruff-ic Bell and General Telephone to provide us with cabling where need it," Petiter continued. "We always have to make sure we have a contract every time we get something from Pacific Bell or they get something from Pacific Bell or they get something from they from they get something from they from they get something from they get they g

(Continued from Page 30) relephone of California be arred.

A July 28 approaches, unique the continued of the page and the page and the continued of the page and the page a



Fred Valles of AT&T Technologies in a Pacilities Trailer

Special Section: The Dlympics

# MESSAGE MOVING

By Katherine Hafner

The Los Angeles Olympics Organizing Committee (LAOOC) building is a large, beige nondescript affair in Marina Del Rey that used to serve as an aircraft hanger. Reaching the building is an event in itself, a vorget that takes the unsuspecting traveler through a mare of plamlined, one-way allesy before coming upon, the unobtrustive enterior of the LAOOC headquarters, where there is no clue to the activity inside.

Hafner is sentor writer for Computerworld On Communications.

## Message Moving

Once a visitor makes his way past an unrelevating security search and enter the guas of the building. he can see that the 1994 Sum mer Olympics are already in action: Coca Cola machines every five yarch dispensioning free soft driabs peasing free

At the 1976 Summer Olympics in Hontreal, messengers on bicycles pedaled from place to place to deliver messages by band. If that system were used for the 1984 Summer Games, it would require eliber messengers with gargantum quadriceps or bundreds of Honda 1200s.

which was then accepted tailor-made software pro- not to be confused with a specific automation system as tee. "We're giving them a MCQuartie said." That is

T&T has dubbed technol-

"It's true if you think about it," McQuarrie said. "I think anyone would agree that there would he no possible way to have an orderly Summer Olympics without this electronic

Bringing order to the Olympics in the form of the electronic messaging system involves setting up a network of 1,700 Tele-

ESS CONSPICUous but just as ment of the 1994 Summer Olympics is the elecorytem to be used for the dupence, action of the mer Olympics in Mooreton of the control of the mer Olympics in Moorewere used for the 4,500 by hand. If that system were used for the 4,500 by hand if that system were used for the 4,500 by hand if that system were used for the 4,500 in Los Angeles, it would in Los Angeles, it would have been seen that the system with gargantum quadritic that the system of the 1995 Month 1200 and 1995 Mon

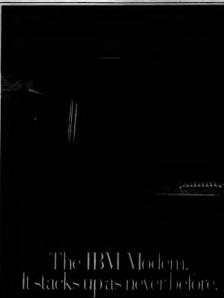
in its capacity as the of ficial telecommunication sponsor of the 1984 Sunmer Olympics in Los Ar geles, AT&T has spemore than a year developing an electronic messay ing system for the Olym

coaches, athletes, repo ers and game officials it ability to inquire about a sults or biographical info mation, communicate wi one another and write as transmit news stories. Given that the Los Ano

les Olympics are neithe federally nor locally fit manced, the city of Los An geles decided not to con struct a separate Olympic facility and to rely instead on existing building spread throughout the greater Los Angeles area. "To cover the 4,500 transcentile, area of the control of the cont

Olympics, communications became very important, Joseph McQuarrie, Tantant of the Olympics, said. "The LAOCC came to us and asked if there was anything we could do to help them out. So we turned Bell Laboratories loose on developing the electronic messaging system."

In November 1982.
AT&T approached the
LAOOC with a proposal



60 COMPLETENCE & CH COMPANICATION



video display terminals, 300 Telexpe prinzen, 165 Informo Systems Corp. control of the state of

the electronic messaging system makes an ideal bit of exposure for the machines. "There's a very unique opportunity here for ATAT to showcase its technologies and applicational and domestic sudience," Bill Highsower, ATAT weep president, Olympic Project Coordinate, ATAT when the president, and the property of the project coordinate with the project coordinate and the project coordinate with the project coordinate and the project coordinate with the project coordinate and the

tous "star in mo-

tion." Terminals will be placed strangically throughout the different venues at the Olympics, with more terminals at sites where there is the most traffic. The International Broadcast Center (IBC), for insuance, ABC's center for broadcast media will beause 100 terminal.

"Places like the IBC an he press center in the Loungeles Convention Cere or wherever the load inexivest would have the pressest concentration cerminals," Bob Estreff, pokesman for the project aid. "For instance, I'mate tract-and-field would lave a lot more than the

The electronic messaging system, which will operate 24 hours a day, is expected to produce result on the screen within 59

The rack-mounted IBM 3868 Modem saves you space. And money And effort.

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"There's a very unique opportunity bere for AT&T to showcase its

technologies and applications before an international and dome; Bill Biology Bill Highton Bill

igbtower said.

timated at between of and five seconds, depering on the amount of a tem use, as well as the ty of transaction being p formed. And transmissi speeds will vary from 9-bit/sec up to 56K bit/sec

ten, which presents choices in both English and French, requires no prior technical inowledge to learn how to use, according to Walt Corwin, supervisor of the Olympusers electronic messaging system development. You can imagine what it would be like to have \$50,000 people who need-

would be a tremendous training load."

According to Corwis Bell Laboratories worker closely with AT&T and

ue verop

"With 50,000 users, you're not going to know the ID of the people you want to send mail to. We bave a data base that bas all the users, and if someone types in a name that might not be spelled right, we've developed an algorithm that gives you some choices," Corwin said.





# Now a major advancement in Net/One local area networking. Lower cost.

Net/One from Ungermann-Bass

Of course, the reliability of the system is yet to be proven, and while simulation at the swimming trials proved

beipful, the real proof will come in July, when it is con-ceivable, but unlikely, that 50,000 people could try to log on to the system simultaneously.

at such and such a time for a press conference, "he explained. "So what we came up with was something a bit more sophistica-ed than a regular bulletin board where just anyone can stick up a message," he continued.

T FIRST; CORWIN said, the bulletin board was to be just for the use of the

to

mining people, and defen a lot of their needs as well. Now we are of their needs are needed as the needed as

packet local-area network that can cover up to a mile.

Of course, the reliability of the system is yet to be proven, and while simulation at the swimming trials proved helpful, the real proof will come in July, when it is



Joseph McQuarrie, AT&T's manager of special projects for the Olym





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Special Section The Ilympics

# GLASS BACKBONE

By Bruce Hoard

The Summer Games of the 23rd Olympiad in Los Angeles July 28 to Aug. 12 are The Olympias of Big Numbers and High Technology. They are expected to be watched by 2.5 billion television viewers — roughly half the world's population — attended in person by 2.5 million spectators and covered by 15000 journal-ists. The 23 events will take place over a 4,500 square-mile area with 190 miles separating the northermous venue (Luke §

Hoard is editor of Computerworld On Communication

ABC bid \$225 million to broadcast 187 bours over 16 days. The network has put 2,500 em-ployees, 144 studio cameras, 64 handheld cam eras, three bouseboats and five belicopters to work on the project.

tal of 1,300 combined



# 5 Day Delivery! Paradyne 2,400, 4,800, 9,600 BPS CHALLENGER Modems

RANK J. FEGER, ABC's manager for telecom-

Johnson stressed the fact that Pacific of the costs the company incurred con-structing fiber-optic facilities for the Games, some \$9.5 million in what would normally be nonrecoverable costs. Olym pics customers such as ABC are paying off that debt, at the insistence of the California Public Utilities Commission.

will operate trailers at many of the



Walking through one of the transmission trailers is like taking a tour of a miniature central office switching station. Lloyd G. Carter, a member of General Telephone's administrative staff

wbo bas been spearbeading the woo has been spearoeating the development of its support, said the trailers are using existing equipment. "The only thing we did was put it on wheels," Carter explained.

put it on wheels," Carter explained.



You can deal either with all of these companies for a total communications system



for transmitting data, private line telephone, telex and radio, Just to make sure things stay cool, there are two four-ton six conditioners. "All the communications requirements we normally have in the network, we can do here," Carter said.

"It really is a small central office. The only thing we don't do is switch," he explained. During the games, the video

signal will be originated in an ABC camers in analog form and sent to the trailer via couxial cable. From there, it will wind its way through monitoring equipment and be converted through a digital releviation lightwave system in the trailer. The digital light pulses are then fed into a fiber-optic spur outside the trailer

a 90M bit/sec to the IBC and another digital television lightwave ystem where they will be reconcerted to analog.

HIS MAY SEEM SIMple to the millions of Olympics viewers who simply turn on their selevision sets a home, but the project required befry negotia tions. Rever said the

made it difficult to figout which company or compas—among them Pacific Bell kT Technologies, Inc. or kT Information Systems provide these services. Regie il be was certain that General

said he was certain that Genera Telephone would provide aer vices because it was not divested. He did not recall negotiation with General Telephone and Pa

Were it not for the fiber network, the broadcaster would bave bad to rely on extensive micro-

wave coverage, which is a problem in an area already clogged with as

many microwave frequencies as Los Angeles. "It would bave been a problem to do it all at the same time," Feger said.

problems with the costs from the telephone companies and were tooking at other ways to provid the facilities, but in negotiations we finally ment at a point of agreement." he said.

"For my part, which is telecom munications, video and the sup port facilities for the telephone and private lines, I think it will be close to 85 million. And if you think of manpower, lodging and traveling from the East Coast for all the engineers, it is a lot more," be said.

retwork is the key to making the 1984 Olympics double for ABC. Greet in tof or the fiber network, the broadcaster would have had to hely on extensive microwave coverage, which is a problem in an urea already clogged with as many microwave frequencies as Los Angeles. "It would have been a oroblem to do it all at the same

Feger, who has been working on ABC's Olympic coverage since 1982, summed up the entire project like this: "It is just an im



## or all of these.

A simple enough choice.

After all, when it comes to building a national, regional, or local communications system, what you don't need is a lot of different companies to contend with.

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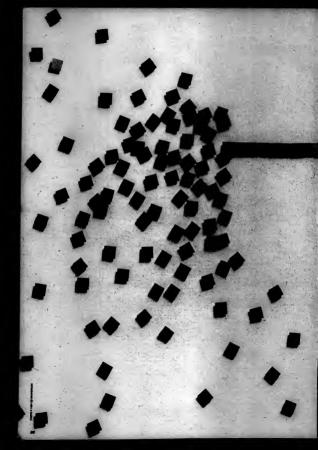
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## MICHARO APOUT MILITPLEXERS

#### IV IE GEN

The data communication inclusive staned out simply with the negativeness of accessing data-processing resources from remore locations. This set play with the negative from remore locations. This set came the need to share the modern beardwist as the same distribution of the need of the need to share the modern bandwisth among multiple users, which remained in the deed out with basic frequency division multiplexing changes (see addition or Bage 70), overhead into time division multiplexing and finally mutured and gasket synthesis, based new others goods:

The manner optimizes responsible or to the fluidplearer measuraphosis are still alive today. Technological advancements and the accelerated pacdictanges in the regulatory, data processing and telecommunications environment are creating new ground rules for transition of multiplearer networks. As a result, so single multiplearer technology can adequately handle the growing needs of ony can adequately handle the growing needs of

As nervodus have evolved, the user has good from a simple single-boar configuration to several matthewards bisoss with multiple geographical dispersed locations successing the host resource (see Figure 1 on Page 69). These complex configurations create the need for sophistic and management and control techniques and the deployment of powerful and highly functional networking modes. They also make it necessary to increase the

Sudan is director, network products, Codex Corp., Mangleid, Mass.

#### Multiplexers

In addition, data com munications costs have been steadily increasing in the past few years, making cost-effective solution even more crucial. By the end of this decade, it is expected that deas communic cations will account for processing expenses. As it result, it has become important for data communic cations users and vendor to optimize data communic

The past two to three years have seen an onslaught of significant changes in the communications environment. Perhaps the most important of these changes is the AT&T divestiture, which has created new transmission services and associated tariff structures.

keep abseast of market changes shaping the future years have seen an one differs networks.

The past two to three changes in the communications environment. Per-shaps the most important or significant.

these changes is the ATA investment, which has one interesting which has one tied new transmission ere trices and associated tariff structures. The impact of the divestiture will be fell for years to come as new and the structure of the properties the properties of the properties the properties

ternatives for use new control of the control of th

Merwork designs, 
Network 
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HE DIFFER
ence in adence in

Another factor that is shaping the future of multiplexer nerworks is the



recent solvancement in local-iera networking, wood-sala interpation and the communications needs of the office of the future.

cardy'change the complexion of future multiplexer designs. Local ness introduce their own kilosynthesis of the communication of the

fers.

The evolution of ISDNs will create its own unique demands on future multiplexer designs. There will be requirements for supporting higher speed data arreams, carrying bit stream data and supporting the stream data and supporting the stream data and supporting the stream data.

carrying bit stream data and supporting interface standards such as X 21 and others as they evolve. All the factors mentioned above will contribute to the shaping of future multiplexer designs and

STOM

Figure 2. Simple Application

networks. These changes in the environment have already inpact ed baste network topologies. For example, consider time division multiplexing. Until recently, time division multiplexing was facing virtual extinction in face of the new statistical time division multiplexing have been examined to the control of the control

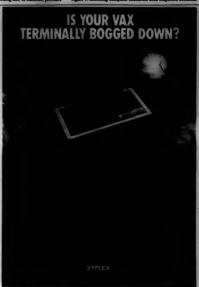
high transmission speeds such a 506 bit/sex and 1.54h bit/sex he revived the utility of this technol opy. It has, among other things fueled the voice-data integration process in many corporate comcesses, users are less concerne about the limited bandwidth constraints that had previously drivet them into using the statistica time division multipletant proniques. The ghren of IsDNs and the content of the bandwidth will increase the utility of time division multipletant.

plexing technology gained popularity a decade ago because it we more cost effective than concertrator alternatives and made bette use of the communications has width that time division mulplexing technology. Since the many changes have taken place, the statistical time division mulplexing world. Technological a vances in microprocessors now a vance in microprocessors now a vance in microprocessors now a vance in microprocessor now a simple applications where a feterminals scores a remote micomputer (see Figure 2).

At the other extreme, users needs and technology have forced statistical time division multiplexing to evolve into higher function network processors, as shown in Figure 3 on Page 70. In this application, the network processor not only performs statistical multi-



Space 1. Accessing Commuter Resources from Disnemed Local



#### *dultiplexers*



for these applications and in mul-tivendor host computers environ-

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# **PAGING PROGRESS**

BY HELEN PETERSON

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#### **Peaing Progress**

from primarily a locato service to a message delibery service illustrates th broad evolutionar changes in communications to meet the needs of a highly mobile, information-hungry society: Ware all in a burry and wan

AGING Was both and the second second

pagers are in use today Over 1.6 million of ther are served by common cariers and the rest by privat systems designated by the FGC for such uses as special emergency, business public safety, industrial and transportation as

There are more than 700 radio common carriers in the U.S., and they provide more than 85% of all public paging service. Local telephone companies, mainly the Bell companies, promide the rest.

Besides the public-pervate dichotomy, the paging industry has also had largely separate services and equipment sectors. Many record common carriers are family-owned local businesses, and many also operate elephone asasswering services as an added struction to paging customers. Many large firms are ac-

quiring local paging operations sationwise, which the paging service business. The major paging service operators, measer Orepite Scanning, loc., Metromedia, Inc., Inc., Metromedia, Inc., Copp of America, RAM Broadcasting and Lin Broadcasting Copp Leadton and Copp Lead-Copp Lead-Co

How much has paging

Paging was born more than 30 years ago.
World War II and the rise of the automobile
culture created a need for coordinated mobile
communications. The Pederal Communications
Commission first allocated mobile radio
frequencies in 1949.

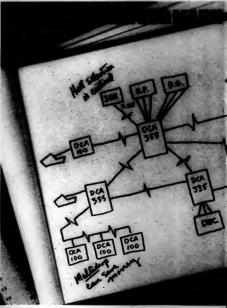
AS
re grown and how fast will it
re grown and how fast will it
re grown
By 1979, the number was reach 20 million pagers,
lid in 1969, fewer than just under 900,000. By eight million to 10 million

of them served by com-

In addition to allocating for frequencies for pubc and private uses, the GC has authorized the se of broadcast FM subhannels for nonbroadcast

ng paging.

In light of these changes, paging companies are rethinking several aspects of the paging business. These aspects in-



72 COMPUTERWOOLD ON COMMUNICATION

#### paina Progress

The paging instrument itself is undergoing a radical change. The first pagers were the sixe of bricks and almost as bears. The paging range was only 50 feet from a cable installation. There was no selective paging to as individual pager until 1965.

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#### aging Progress



A Typical Paging System

ly, one con d a 5.6-o r with 24-

phone.
Alphanumeric
however, require some
kind of conjunct reminal,
and of conjunct reminal,
or's location or at the central dispatch location or at the central dispatch location. The
cost of those terminals is
still quite high,— between
\$500 and \$500— and until
down considerably, there
will not be large-scale alphanumeric paging, At the
present time, businesse
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can use alphanumeric pagin
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word processing sy

Albbanumeric display paging is predicted to be the next big leap forward for paging, providing the true delivery and integra-tion of words and numbers.

Currently, pages can be initiated by anyone with a push-tone

phone.

speed of signaling — how quickly a page is sent — will probably increase dra-matically. Increases in the signal-ing speed mean each page occupies less air time, and the operator can accom-modate more pages.

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#### BY D. R. McCORMICK

It's 1984. IBM has begun to ship 3725 communications concrollers in volume. Systems Network Architecture (SNA) has been significantly enhanced with the capability to interconnect multiple independent SNA networks. The new function runs on the IBM 3705 and on Amdahl Corp.'s 4705 and 4705 series communications.

McCormick is president of a COM Associates, Raleigh, N.C.

tions controllers. NCR Comten, Inc. has announced new price/performance models of his line of communications front ends. Tandem Computations front ends. Tandem Sono, incerface that allows Tandem's Non-stop processor to communicate in SNA networks — on its new 6100 communications processor, an ounced late in 1983, that operates with its new Nouspor TXP. The industrial processor is not the stop of the

#### Front Ends

If you ask the average data processing manager bow be manages one of the most important resources in the information management shop, be will usually say be relies on the Hone configurator to tell him how to add lines to his control-

ler. This is generally accomplished under the "Oops" principle: Add more resources to the box, and if no one complains about poor service levels - fine.

evels — fine. If you get com-laints, back out the new resource troller.

In Hone configurator is not the Hone configurator is not

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main vendors' products stack up now and what may be in store for the future.

Inc 3722 was announced bit in 1983. It was upgraded in November with added functions which further sets it apart from the 3705.

Clearly, this is the unit for the large. SNA user who will be harding many medium- and high-speed lines concurrently in beame box. This unit's ability to accommodate as many as 14 256K by/sec lines demonstrates the power that can be consisted in one unit with balanced lapar and

output. Two additions to the 3725 not found on the 3705 are 128 modition to on links between intermediate routing nodes and 2M bytes of storage for additional buffer spec storage for additional buffer spec on larger gateway network control portains (NCD). The 128 modulo addition allows up to 177 blocks of data to be transmitted before waiting for a receive acknowledge-

The 3705 architecture is limited to 114-byte addressing, it is not clear why 126 module is not supported by the 115-byte addressing it is not clear why 126 module in the 115-byte and 115-

15% of a similarly equipped Model 1.

This 15% is a modes price to pay to avoid possible service in terruptions when a future model upgrade appears. Technology in Exchange 1.

This 15% of the 15% in the 3705-80 price range of lower. This unit would be nuisable for future intermediate routing nodes in the large MSNF octwork. For the time being, support of the 5705-59 xM 4705 short-term life in this environment.

Of course, the whole world is not composed of multiple IBM 370s talking to one another. For the very large base of single-CPU or single-establishment customers, the current 3705 family and look-alikes will fare well and provide competitive solutions to their front-end needs. Prices for use 3705s have fallen below 50% of IBM list. Certain configuration

one. It is never new development to all this A california from her to to all this A california from her to ga a 144-yre consistent of the physically boused in the firmer of a 3705-11 or 3705-8 when 18M upgaded the 3705 is 12K bytes with the J-K series, automatically gave the 5705-11 of resulting capability to 114-yrs Anniah was the first to explose this capability in 1st 47052 m ment for the 3705 will give the ingre base of purchased 3705s mer lease on their there is the green of the capability to 184 years of the series of the

with mininum change.

to leave Amdabl? For one thing the 4705 and the 4705 have faster engine producing monocommunications control unit than the 5705. This is particularly available in running large 2370 Binary Synchrotosus Communications of the 4705 and 5705 mass out of cycles before tans out of storage. Amdabl also she shelligt to run NCPs greate than 512K bytes without moving to the newest Vann and other hos other hosts of the producing the shell of the shell of

ary to operate 3725s.

Surprisingly, NCP Version 5's billity to extend key control block boundary.

sion feature significantly viable than previous NCP re-

use of memory beyond 5121 bytes.
Furthermore, there is a strable base of Amdahl 4705s that interface to X.25 public and private networks. This should allow them

since to X.29 public and private networks. This should allow these out 1984, Look for a drop in 4700 sales as the large customers begin making new decisions to expand was provided to the control of the vasage of lower stellfor 566 bit, see and T-1 speeds. Of course, see and T-1 speeds. Of course, and the course of the course of the vasage of lower stellfor 566 bit, see and T-1 speeds. Of course, was the course of the course of the vasage of lower stellfor the course of waste of the course of the course of the would increase their course and create maintenance problems on the base NCP.



#### IN ONE INTEGRATED SYSTEM!

Wall Date, the industry leader in multi-function total conversion product announces another may advance. Last very Williams

advance. Last year, Wall Data introduced the DCI series, the early protoco conversion system capab of concurrentity supporing multiple protocols or

Now Wall Data enhances that flexibility with INTER-GUARD, a disaback security feature that offers extra prolection for dial up access to data networks.

works:

1. A remote terminal or it
dials up the DOP

2. The DO' prompts, "ENTE USER D." 3. The user keys in his D. 4. The DO' worker the D.

5. If valid, the DCF display
TILL CALL YOU BACK
and disconnects.
6. The DCF looks up and

ber opposited with the user ID.

7. The user conswers, and the DCF prompts, "ENTI HOST PASSWORD."

9. The DO' connects the us to the host and display the logan screen.

the logon screen.
Thus INTERGLAND provide three levels of security to protect your computer re-

tion, location identification, and password surfaction.
Other features include:

Other features include: Dialbook security and protocol conversion in one unit Up to 15 dialup ports

 128 user IDs and telephone numbers
 20 host passwords
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 Easily maintained ID or

idle-time disconnect Uter specified retries on timeouts Private on insures \$333 Wall Date offers standolone INTERGUARD syste without prolocol conversi in four- and eight-port configurations.

For more informational Wall Data toda

The Data

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#### Front Ends

Comten's family of communications processors was given a significant shot in the arm with a new round of price/ performance to replace its aging 3650, 3670 and 3690 series. Comten is alive

and well and enjoying continued growth.

It is obvious that the explosion to teleprocessing, on-line data bases and personal computing bas not burt them.

like the average garage sale with speakers and autodialers and into coax footprints all over the place. all ROLM has done is to intro-ce an entire family of phones that bring digital technology all the digital technology all the to the desk. So, for the price of an analog phone you can have unheard-of commutelephone wire.
There's a \$100 ROLMphone\*
utton commands, speed dialir



pice volume control and an optional RS232 port or flawless, simultaneous data and voice

aramssoon.

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Then there's Oppress. nere are ROMphoes that can sell you the caller's temperature of the Revenue to the caller's temperature of the call the cost of the call.

Then there's Oppress.

Then there's Oppress is a super compant, smart ASCII terminal

#### Front Ends

# This modem will pay for itself in four months.



The Al 4048 has an intelligent front-panel with push-button remote diag-





#### Money on the Move

branch. These systems speed up customer service and allow insants verification of account balances are serviced of account balances are sentimentally 50° of a total extension of 150° of 1



#### oney on the Move

words will consolidate many retail banking services. Two of the most innovative shared networks that are successfully meeting the chal-lenges of today's financial ser-vices industry are Cirrus and The Exchange.

The Cirrus system is a nonprofit

The Circus and the The Circus and the The Circus and the In-Circus and the In-Circus and In-Circus a

out. Membership in Cirrus is exclu-sively reserved for banks, savings



#### Money on the Move

technological in-that could have a ng effect on per-king and money ept in the func-

machine, the regional switch receives electronic messages and transmiss them to the appropriate institution's computer center. That computer makes decisions concerning the transaction and transmiss them back to the switch.

chine to dispense cash or to perform some other function. Located in Seat-tle, Wash, the switch coordinates all transactions made within this region.

The Exchange National Switch, which is located in Clinton, NJ, and owned by ADP, acts as a go-between for all Exchange regional switches. When a custom-reconsests an automated

The switch then directs the automated teller ma-chine to dispense cash or

#### SIEMENS

#### What separates our least cost routing from all the others?

Siemens.



Innovations in telecommunications for over a century.

#### Money on the Move

purpose, mainframe oriented data processing Diebold, Docutel, IBs and Intelligent System Corp. have specialized it this market. These firm should achieve above in dustry-average revenue in creases of well over 19% : year.

year.

Among the data procesing services firms, AD National Data Corp. at Tymshare, Inc. have f cused on the EFT marks but only the latter two

have had a signification can up to commitment to in fluence their short-ter sales growth.

In spite of the promit of increased efficiency areduced cost, EFT system face assorted problem Chief among these a

consumer resistance a iegal problems. Consumer are worried about: Privacy invasion and potential for abuse of formation collected; a The possibility of co puter crime and error;

a The probability that it cost of implementatic will be passed on to ther a The lack of the securi associated with cancelle checks and sales receipts a The loss of float;

between the possibility of lost inches certain.

The reliability of systems.

Legal problems relate to: federal regulation; the establishment of branch

uncertainty as to whetl terminals constitubranches; and governm acceptance of shared i minals between comp ing financial institution in some states, rest tive laws prohibit most of

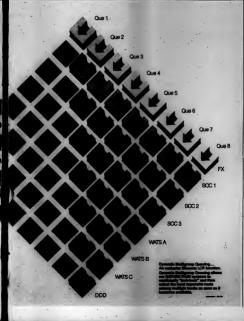
ing financial institutions. In some states, restrictive laws prohibit most off premise terminals. Banks in such states will be at a disadvantage compared with those in unrestricted states in gaining EFT markets. The Supreme Court

f-sale machines are ranches if they are used or deposit- and withdraw irelated services. As such, they must comply with the banking restricons of the state within hich -they are located, his ruling applies only to nomencial banks. Thrift noting applies only to ownercial banks. Thrift salitations are not prohibed from offering deposis of the original services at oist-of-sale terminals.

quired to install off-pr nise EFT machines a states where branches a sweet where branches a very states have enacte egislation to exempt rets EFT machines fro oranch restrictions. In other er states, sharing of all EF nachines is mandator

to be in operation by the Memory is a sea of the Memory is a sea of

mich these terminats pacipate is our of sight are att of mind as far as thablic is concerned. If the their popular media, Etiticly to be embraced to the public long before it ill potential is recognize y most people. Sit onen all is said and don the may well be living a almost paperless, cas





T. Owen Hull, above, chief of data communications, Sikorsky Aircraft, remembers what be thems his "first his recommon."

I have been in the data processing industry for 21 years, but m first big screw-up will always sta

Twenty years ago, the larg computers that we are all familia with today did not exist. At thime, I worked to a large sho with many IBM 1401 computer that had a grand toasi of 8K byte of memory. The only 1/O device were a card reader, card punch and, of course, a 600 line/min

Since we had no tope or disk drives, most I/O was done with the card reader and the card punch. The Fortran compiler was about 3,000 cards punched in load-module format, with several phases, known in today's terminology as overlay structures. Conpiler work files were punched on the card punch and read back in through the card reader as input. Cone nieth on sevond shift.

One night on second shift, I was working alone in one of the computer rooms running compiles and testing. One of the jobs was to run Fortran compiles, and I

y floor. I then had to play the game of 3,000 pickup.

I knew that they were out of sequence, and I knew that they were sequenced in columns 73 through 80. So, I an them through the card sorter in order to make the compiler useful again. In those days, the card sorter operated as the phenomenal speed of 600 card/min, but each column had to be processed individually or eight passes of the card deck through passes of the card deck through

work. What I had failed to recognize was that each phase was sequenced separately. In fact, I had 100 card "ones" together, 100 card "twos" together and so on. In those days, the backup for the card deck was a listing of each card, so in order to get the Fortran compiler openable again, I had to match each card with the listing, It took hours to get the compiler

the area of backup and recovers
but in the old days, dropping
box of cards could be a major of
tastrophe.

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